

TITLE OF THE INVENTION

COMBINED STRUCTURE OF FRONT PART OF CABIN OF AUTOMOBILE

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based upon and claims the  
benefit of priority from prior Japanese Patent  
Application No. 2003-066719, filed March 12, 2003, the  
entire contents of which are incorporated herein by  
reference.

BACKGROUND OF THE INVENTION

10 1. Field of the Invention

The present invention relates to a combination  
structure of a front part of a cabin of an automobile,  
and a combining method.

2. Description of the Related Art

15 An automobile has a dash panel, a cowl side panel,  
a hinge pillar (a front pillar), a side member, and  
a cross member, in the structure of front part. Refer  
to, for example, FIG. 1, FIG. 3 and FIG. 13 of Jpn. UM  
Registration No. 2531718. A dash panel is placed in  
20 a front part of a cabin crossing the width direction  
of an automobile. A cowl side panel is joined to the  
left and right sides of the dash panel, and extended  
rearward.

25 A front pillar is joined to the rear end of a cowl  
side panel, forming a closed section against a cowl  
side panel. Each of left and right side members is  
joined to the dash panel at a position more inside than

a front pillar, and placed forward from a dash panel. A cross member forms a closed section against a dash panel, and placed in the width direction of a body, connecting the rear end of a side member.

5           When a cross member is attached the dash panel from inside of a cabin, both ends of the cross member is bent rearward along the dash panel and cowl side panel, and joined to the front pillar. When a cross member is attached the dash panel from outside of the  
10           cabin, both ends of the cross member are joined to a side member. A reinforcing member is fit along the dash panel and cowl side panel, between the front pillar and the inside of a cabinet of a dash panel at the position fit with the side member.

15           However, in the above structure, a flange combining the dash panel and cowl side panel is made at the position face to the outer circumference of a tire. Therefore, the dash panel and cowl side panel must be provided rearward from the tire with a space equivalent  
20           to the flange, to prevent the tire from contacting to the flange causing a burst. Thus, the cabin is narrowed. Besides, since the position of the front pillar is backed, the position of providing a front seat door is shifted rearward, making it uneasy to get  
25           on and off the cabin.

          When the cross member is provided inside of the cabin, there are a few part difficult to approach by

a torch for spot welding in order to join an area between the cross member and the dash panel after the side member and the dash panel have been attached. Similarly, when the cross member is provided outside of the cabin, there are a few part difficult to approach by a torch for spot welding in order to join the area between the dash panel and the reinforce member after the side member and the dash panel have been joined, to join the area between the end portion of the cross member and the side member after the dash panel and the reinforce member have been joined.

Therefore, it is necessary to cut any portion to make a working hole to insert a torch. But, this is undesirable, because if a working hole that is a kind of opening is made in the rigid member, the rigidity is decreased.

#### BRIEF SUMMARY OF THE INVENTION

The present invention provides a combined structure of a front part of a cabin of an automobile with sufficient rigidity while keeping a cabin space.

A combined structure of a front part of a cabin of an automobile according to the present invention has a dash panel and a front pillar. The dash panel is placed in the front part of a cabinet, extending in the width direction of an automobile, and forms a tire house which is bulged toward the inside of a cabin under both left and right sides. The dash panel has

a panel flange extending rearward of vehicles from the proximal end of both edges. The front pillar is formed by a front pillar inner and a front pillar outer joined in a pillar flange where they are faced each other in the width direction. In the front pillar, a pillar flange in the forward of vehicles is joined to the panel flange. The front end of the pillar flange is located more rearward of vehicles than the proximal end.

The combined structure of a front part of a cabin of an automobile according to the present invention further comprises a reinforcing member which is attached over the dash panel and the front pillar inner. In this case, the combined structure of a front part of a cabin of an automobile further comprises a side member which extends forward and rearward of vehicles, and has a rear end joined to the dash panel, and the reinforcing member is joined to the inside of a cabin of the dash panel which has been attached the side member from the outside of cabin. The front pillar inner has an inside wall, and a front wall bending outward of vehicles from the front end of the inside wall, contacting the rear wall of the reinforcing member with a corner formed by the inside wall and the front wall. Further, the combined structure of a front part of a cabin of an automobile further comprises a cross member which is extended in

the width direction of an automobile and joined to the front of the dash panel while the rear end of the side member is joined to the cross member. In this case, the panel flange is joined to the pillar flange from the inside of a cabin. In the combined structure of a front part of a cabin of an automobile, considering the sealing of a cabin, the panel flange is inserted and joined between the pillar flange of the front pillar inner and the pillar flange of the front pillar outer.

A method of combining a front part of a cabin of an automobile according to the present invention includes a step of joining a panel flange which extends rearward of vehicles from the proximal end of both side edges of a dash panel, to a pillar flange which extends forward of vehicles from a front pillar inner, at a position where the front end of the pillar flange is located more rearward of vehicles than the proximal end; a step of joining a reinforcing member to a dash panel and the front pillar inner; a step of joining both ends of a cross member which extends in the width direction of an automobile, to the rear end of a side member which extends forward and rearward of vehicles; a step of joining the cross member and the side member, which have been joined each other, to the dash panel; and a step of joining a pillar flange of a front pillar inner and a pillar flange of a front pillar outer.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is a perspective view of a combined structure of a front part of a cabin of an automobile according to an embodiment of the present invention, viewed from the inside of a cabinet;

FIG. 2 is a sectional view of the combined structure at a position where a reinforcing member is passed along the F2 - F2 line shown in FIG. 1; and

FIG. 3 is a magnified perspective view of the combination of a front pillar, dash panel and reinforcing member of the part F3 shown in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

A combined structure of a front part of a cabin of an automobile according to an embodiment of the present invention will be described with reference to FIG. 1 to FIG. 3. The front, rear, left and right are defined by taking the automobile advancing direction F as a reference, and the direction toward the center of an automobile is assumed inside, and the direction separating away from the center of an automobile is assumed outside. FIG. 1 shows the state near the combined part of a dash panel 1 and a front pillar 2 on the front left side of an automobile, viewed from the inside of a cabinet. As shown in FIG. 1, the combined structure of a front part of a cabin of an automobile includes a dash panel 1, a front pillar 2, a side member 3, a cross member 4, and a reinforcing member 5.

The dash panel 1 is placed in a front part of a cabin, crossing the width direction of an automobile. The lower end of the dash panel 1 extends rearward to the floor panel of the cabinet. Under the left and right sides of the dash panel 1, a tire house 11 is formed, which bulges toward the inside of the cabinet, so as to avoid a front wheel. The front pillar 2 is placed on the left and right sides of the dash panel 1, curving along both ends of the dash panel 1. The front pillar 2 has an inner 21 as a front pillar inner facing the inside of the cabinet, and an outer 22 as a front pillar outer facing the outside of the cabinet. The inner 21 and outer 22 are provided with pillar flanges 23 and 24, respectively, extending in the direction to project from the outer circumference of the front pillar 2, and joined by these pillar flanges 23 and 24, forming a front pillar 2.

As shown in FIG. 2, a panel flange 12 is formed at the left and right side edges of the dash panel 1, extending from a proximal end 13 to the rearward of vehicles. The front pillar 2 and dash panel 1 are joined at the position where the front ends 25 and 26 of the pillar flanges 23 and 24 of the front pillar 2 are located rearward of the proximal end 13 of the panel flange 12 of the dash panel 1.

The side member 3 is joined more inside in the width direction of an automobile than the front pillar

2 and the outside of the cabin of the dash panel 1.  
The side member 3 extends forward from the dash panel 1, and extends rearward from the underside of the dash panel 1 along the floor panel.

5           The cross member 4 is placed in the width direction of an automobile as shown in FIG. 2, and both ends 4a are joined to the rear end 3a of the left and right side members 3. The cross member 4 is joined to the dash panel 1, forming a closed space so-called  
10 a closed section that is closed by the dash panel 1 and cross member 4.

          The reinforcing member 5 is joined so as to connect the inner 21 of the front pillar 2 to the part 14 of the dash panel 1 from the inside of a cabin,  
15 after the dash panel 1 has been attached the side member 3 from outside of the cabin. The reinforcing member 5 forms a closed section against the tire house 11 of the dash panel 1. The rear wall 5a of the reinforcing member 5 comes into contact with a corner  
20 21c formed by the front wall 21a and the inside wall 21b of the inner 21.

          Next, an example of a process of joining each member will be explained. First, the dash panel 1 and inner 21 are joined. In this case, the dash panel 1  
25 and inner 21 must be joined in at least the area covered by the reinforcing member 5. After joining the inner 21 to the dash panel 1, the reinforcing member 5

is joined to the dash panel 1 and inner 21. The rear ends 3a of the left and right side members 3 are joined to both ends 4a of the cross member 4. The cross member 4 and side member 3 which have been joined each other are joined to the dash panel 1 that has been joined to the reinforcing member 5.

The outer 22 is joined to the inner 21 and dash panel 1 that has been joined to the reinforcing member 5. In this case, it is permitted to attach the outer 22 either before or after joining the cross member 4 and side member 3 to the dash panel 1. In the area attached the reinforcing member 5, the spot welding torch cannot be inserted. Therefore, the front end 26 of the flange 24 of the outer 22 and the front end 25 of the flange 23 of the inner 21 may be joined like an edge joint by MIG or TIG welding. The above joining procedure is just an example, and other assembling procedures are permitted. It is also permitted to join the pillar flange 23 of the inner 21 from the inside of the panel flange 12 of the dash panel 1, and join the flange 24 of the outer 22 from the outside of the panel flange 12 of the dash panel 1, so as to be sandwiched the panel flange 12 of the dash panel 1 by the pillar flanges 23 and 24 of the front pillar 2.

In the above combined structure of a front part of a cabin an automobile, the panel flange 12 and pillar flanges 23, 24 do not project toward the front wheel in

the tire house 11. Therefore, there is no fear of  
damaging the front wheel by the contact of the panel  
flange 12 and pillar flanges 23, 24 to the front wheel.  
Thus, it is possible to place the front pillar 2 near  
5 the swinging area S of the front wheel.

The panel flange 12 is formed rearward of vehicles  
from the proximal end 13 provided at both ends of the  
dash panel 1, and the front pillar 2 and dash panel 1  
are joined so that the front ends 25 and 26 of the  
10 pillar flanges 23 and 24 of the front pillar 2 are  
located more rearward than the proximal end 13 of the  
panel flange 12 of the dash panel 1. Namely, it is  
possible to set the distance long from the corner 21c  
of the inner 21 to the proximal end 13 of the panel  
15 flange 12 of the dash panel 1, by the length equivalent  
to the pillar flanges 23, 24 of the front pillar 2.  
In other words, it is possible to take a long distance  
from the rear wall 5a of the reinforcing member 5 to  
the tire house 11, and to make the closed section large  
20 between the reinforcing member 5 and tire house 11.  
As a result, the rigidity of the reinforcing member 5  
can be increased. And, the load upon collision can be  
transmitted from the side member 3 to the front pillar  
2 through the reinforcing member 5.

25 Since the front pillar 2 can be approached to the  
front wheel, the section of the front pillar 2 can be  
enlarged without moving the front pillar 2 rearwards.

Therefore, the rigidity of the front pillar 2 can be increased.

Further, by assembling each member as described above, in the combined structure of a front part of a cabin of an automobile, each member can be welded at the number of spots sufficient to ensure the molding strength of each part without making a window for spot welding in each member.

In the combined structure of a front part of a cabin of an automobile according to the present invention, the flange joining the front pillar and dash panel is not projected toward the front wheel. Therefore, the front pillar and dash panel can be placed near the front wheel. As a result, it is possible to enlarge the closed section of the front pillar and the closed section surrounded by the reinforcing member and dash panel. Therefore, the rigidity can be increased, and the load applied to the side members upon collision can be efficiently transmitted to the front pillar. Besides, since the dash panel and the front pillar can be plated in the front, the cabin space can be broadened.

As described above, according to the present invention, it is possible to provide a combined structure of a front part of a cabin of an automobile with sufficient rigidity while keeping a cabin space.